



COMPARISON OF SPINAL ANESTHESIA WITH TOTAL INTRAVENOUS ANESTHESIA DURING OPERATIVE HYSTEROSCOPY

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ABSTRACT

Background & Objective: Hysteroscopy is an appropriate method for diagnosis and treatment of intrauterine pathologies. Hysteroscopy can be done under variant anesthetic methods and each one has particular complications. The aim of this study was comparing spinal anesthesia (SA) with total intravenous anesthesia (TIVA) during operative hysteroscopy and discusses about each advantages and disadvantages.

Materials and Methods: This study has been performed by randomized clinical trial on candidate patients for operative hysteroscopy between June 2014 and April 2015 in Al-Ahram Hospital. During the study, 76 patients were studied in two groups, SA (study group, n=38) and TIVA (control group, n=38). The results were analyzed by SPSS version 16.

Results: Complications during anesthesia, incidence of post-operative pain, recovery time and irrigation fluid volume in the study group were significantly lower than control group within. Time of operation, anesthesia, and patient's satisfaction in two groups were unremarkable. Blood pressure and heart rate were measured higher in study group.

Conclusion: SI had significantly more advantages and lower complications in comparison with TIVA during operative hysteroscopy.

KEYWORDS: operative hysteroscopy, spinal anesthesia, total intravenous anesthesia.

Introduction

Hysteroscopy is an endoscopic procedure for diagnosis and treatment of intrauterine pathology (1) and using to determine the cause of abnormal uterine bleeding (AUB), endometrial biopsy to evaluate infertility (primary or secondary), repeated pregnancy loss, burn (ablation) of abnormal uterine endometrium in abnormal bleeding, remove the intrauterine device (IUD) and removal of polyps and uterine myomas (2).

Diagnostic hysteroscopy can be done without analgesia / anesthesia (3 and 4) or using systemically drugs (5) (paracetamol, anti-inflammatory inserts non-steroidal drug), a topical anesthetic (6, 7) (paracervical block, intracervically and anesthesia applied topically to the uterus) or conscious sedation (8, 9). Studies have shown that, each of the above methods and medication was associated with advantages and disadvantages (5, 7, 10). Operative hysteroscopy (therapeutic purposes) especially done in anxious patients with intravenous anesthesia. But can lead to complications such as hemodynamic instability, laryngospasm, bronchospasm and increased incidence of nausea - vomiting that lead to more complications in high-risk patients and prolonged hospitalization (9, 11 and 12). In hysteroscopy to view the uterine cavity, irrigation solution is required. The most common solutions used, are glycine, mannitol and dextrose. Glycine may have toxic effects on the heart and retina and causing volume overload and water intoxication (which is called in urologic complication studies TURP syndrome). Mannitol quickly increase blood volume and may cause pulmonary edema in patients with heart disease and glucose cause severe hypoglycemia in patients with diabetes (13,14).

Hysteroscopy and methods of anesthesia:

Surgical procedures should always be used in a technique with the shortest time, reliable (maximum control) and also with minimal side effects in the fastest recovery time (14).

1. Local tissue paravaginal infiltration with lidocaine 1-2%
2. Local infiltration with intravenous sedation
3. Paracervical block
4. Local epidural or SA block
5. Total intravenous anesthesia (TIVA)

In the study of Majholm and et al. (2011), Local anesthesia with remifentanyl was compared with TIVA. Results shown that, in the local anesthesia, ambulation time after the procedure and total time of admission to discharge significantly reduced. Level of satisfaction (to the answer this question "In the future would you prefer this method of surgical procedures or not?") of this method was 91.8 percent versus TIVA 9.64 percent (10). In the field of complications during hysteroscopy, and items that must be controlled during anesthesia and after that, several studies have been done. Pain, nausea and vomiting, difficulty breathing,

hemodynamic abnormalities, bleeding and gastrointestinal symptoms are the most common complications (15, 16).

Studies show that several important factors involved in beginning complications. Such as type of pathology, severity of the disease, direct effects of hysteroscopy procedure. Complications of anesthesia methods are the most important factors that should be considered to patients' better control. However studies have not well aligned in this field. In The systematic study of Rebecca and et al (2012) recommended to using local anesthesia methods for controlling pain following the surgical procedure (18). According the mentioned items and the results differences, it seems choosing the ideal method for hysteroscopy is not clear. There is no comprehensive study that has been done about using of spinal anesthesia (SA) compared to the results with other methods, particularly TIVA. This study was performed according to this aims.

Methods

In This study, which was conducted as a randomized clinical trial, 76 patients who were candidates for hysteroscopy were referred to Al-Zahra Hospital (from June 2014 till April 2015) evaluated in two groups. Among the large number of eligible patients, sampling was carried out according to standard methods of randomization. The sample size was calculated by comparison of two ratio formula in interventional studies. By considering type-I error probabilities on α for $\alpha=5\%$, power $0=0.80(0.05)0.95$ and $n=38$, 38 samples were calculated per group; with the possibility of 10 percent loss of the samples (drop up), finally, 76 sample were selected. Sampling method was consecutive based on the time that patients came to outpatient clinics. Permuted methods were performed according to online randomized software by randomly permuted blocks.

Inclusion criteria:

1. Age more than 20 and less than 70 years
2. Class ASA I or II
3. Hysteroscopy surgery alone
4. Immediately after menstruation

Exclusion criteria:

1. Neuraxial block contraindications
2. Allergic to local anesthetics drugs
3. Systemic diseases (cardio-pulmonary, liver, etc.)
4. Mental Illness
5. Diagnostic hysteroscopy
6. Large myoma (uterus larger than 12 weeks) and sub-serous myomas
7. Uterine prolapse.
8. PID
9. Taking gonadotropin (GnRh)

Sampling and data collection:

After approval of the Ethics Committee of Research Chancellor Department of Tabriz University of Medical Sciences (number=9321) and getting informed consent from patients, 76 patients with ASA class I or II who were hysteroscopic endometrial ablation candidates for the removal of uterine myoma or cervical polyps, were studied in this research. All patients were studied in two groups for anesthetic technique:

After premedication with 5 mg oral diazepam, 30 minute before, operation, and establishment of ivline and standard monitoring included (non-invasive blood pressure NIBP) electrocardiography ECG) and pulse oximetry. All of patients were studied in two gouges regarding to anesthesia techniques.

Anesthesiology methods for control group

In this group (N=38) after pre-oxygenation in patients undergoing TIVA intravenous induction, after 500 ml infusion of crystalloid, TIVA was done with midazolam 0/03mg / kg, remifentanyl 1µg / kg and propofol 1-2.5 mg / kg and LMA was made of the appropriate size. For maintenance of anesthesia during the procedure propofol 50-100µg / kg per minutes and remifentanyl 0.1/1 µg / kg were used per minute.

Anesthesiology methods for case group

In this group (N=38) after injection of 500 ml crystalloid serum within 15 minutes, SA was performed in sitting position, in L4-5 L3-4 vertebral interspace with 25G, Quince type needle, and adding 50-75 mg of hyperbaric lidocaine (5/1-1) ml plus 15 µg of intrathecal fentanyl to reach the 8-10 T dermatomal level anesthesia. Solution 5% was used as the irrigation fluid with appropriate speed and less pressure than 100mmHg (monitoring by hysteroscope). Effluent was collected in canister

Consideration after surgery for both groups

After surgery, all patients were transferred to the post intensive care unit (PICU) after items below were obtained:

1. Achieving alder score at least 9 in the control group
2. Hemodynamic stabilization
3. Completely return to normal motor function (based on Bromage scoring) patients were transferred to the ward.
4. In all patients, the amount of irrigation fluid absorption, hemodynamic changes during aesthesia, hypernatremia symptoms (nausea, vomiting, visual disturbances, depression of consciousness, agitation, confusion, convulsions, muscle cramps) were evaluated.
5. The postoperative pain was measured by scoring the same visual (VAS) in PICU and in times of 3, 6, 12 and 24 hours after surgery. This means that score zero was given to the patient without pain and score 10 to patients with severe and unbearable pain.

Ethical considerations:

This study was done not only with no charge to patients, but also no loss of human. All patients were assured that their completed information is kept confidential and results will be provided by the total sample population. Both methods are commonly used for anesthesia in patients undergoing surgical procedures. And in fact it is, the part of routine treatment process that does not create the ethical problems for patients.

Data analysis:

Data from the study was analyzed by Spss software version 16. All data were analyzed on the basis of descriptive tests and analytical test methods, repeated measures analysis of variance or t - test unpaired students used per cases. The numbers were analyzed by Skewness-kurtosis criteria and non-parametric relevant standardized tests. To evaluate the satisfaction level chi-square test was used. P values less than 0/05 were considered significant.

Results:

In this study 76 patients in the two groups SA and TIVA were studied. The number of patients in both groups was 38. The mean age of patients in the case group $40/9 \pm 11/11$ and the control group $38/8 \pm 3/8$ years, and had a normal distribution. Surgery time -ssince the insertion of a speculum to remove it, duration of anesthesia from the time of injection to the patient awake from general anesthesia or spinal anesthesia blocks back were measured and recorded in minutes. In the study of patients, despite unimportant differences in terms of age criteria, both groups were statistically similar. In fact, patients are quite similar in terms of age and body mass index. In the SA group, 10 (26.31%) patients diagnosed with polyps, and 28 (73.68%) patients with myoma. And in the TIVA group 18 (47.37%) patients diagnosed with polyps, and 20 (52.63) patients with myoma. Despite the significant differences in the type of pathology ($P=0.029$), the surgeons agreed, there was not clinically problem of comparing two groups, so two groups were considered similar. In the review of complications and need to use medical treatments, important results was achieved. In 35 of the patients in the SA group (92%) there is no side effects from nausea or breathing problems, only in 3 cases

(8.7%) nausea and vomiting were reported. These side effects were controlled with medication immediately. In this group only 6 patients (15%) had postoperative pain were in need of medication and immediately was controlled. In 30 patients (78%) did not show any pain and was not prescribed additional medication. But in the TIVA group the situation was otherwise. Only 12 patients (31%) had no complications and did not receive additional drugs.

In this groups 2(5%) patients had nausea and vomiting problem after surgery. 7 (18%) cases were suffering from respiratory depression during anesthesia, 5 patients (13%) with shivering and were requires carefully monitoring and more treatment. 22 patients (57/8 %) had post-operative pain and received analgesic drugs. Of those analgesic drugs In 3 patients (8.7%) needs to be repeated. In analyzing the results with Pearson chi-square method found that all side effects significantly lower in SA vs. TIVA ($P=0.003$) and this group of patients received significantly less medication. Tables 1 to 3 is completely explained all results with details.

The anesthetic complications including shivering, respiratory depression and most important of all, pain after hysteroscopic and the patients need to prescribed medication, in patients with SA group was significantly lower than TIVA. Also recovery time was shorter in this group. Surgery time, anesthesia time, length of stay, ambulation time and the satisfaction of patients in both groups had no significant differences $P<0.05$ (Table 1). Blood pressure and heart rate of patients in the SA group was a little higher, but the overall range of hemodinamical changes in both groups were normal (Table 3).

It seems surgical time and anesthesia time were more affected by the type of pathology and the severity of disease. Additionally, so many factors play a role to determine these times. The similarity of pathological type in groups caused no significant differences in the times.

Table 1 Comparison of times between groups

Time	Groups	Mean	Standard Deviation	Median	**P
Duration of surgery (min)	SA*	3/30	3/10	0/28	0.16
	TIVA**	3/33	3/20	0/26	
Duration of anesthesia (min)	SA	4/47	8/6	0/46	0.06
	TIVA	0/40	3/23	0/30	
Recovery time (h / min)	SA	1/18	2/6	0/18	0.16
	TIVA	1/26	2/9	0/20	
Ambulation time (h / min)	SA	48/4	30/1	0/0	0.43
	TIVA	44/0	13/2	0/6	
Discharge (h / min)	SA	42/12	42/6	48/6	0.27
	TIVA	36/12	31/7	44/8	

*SA: Spinal Anesthesia

**TIVA: Total Intravenous Anesthesia

**P: Pvalue

Table 2 Comparison of postoperative volume of irrigation fluid and sodium levels

volume of irrigation	Groups	Mean	Standard Deviation	Median	**P
Intake (ml)	SA*	2327	1018	1900	0.16
	TIVA**	2113	1823	1000	
Output (ml)	SA	2083	1373	1610	0.03
	TIVA	1680	1093	1100	
Absorbed (ml)	SA	239	103	200	0.001
	TIVA	389	200	300	
NA (mmol/l)	SA	0/139	1/2	0/138	0.75
	TIVA	4/137	0/3	0/139	

*SA: Spinal Anesthesia

**TIVA: Total Intravenous Anesthesia

**P: Pvalue

Table 3: Comparison of the systolic blood pressure during anesthesia

BP #Time measurement	SBP in SP* group	SBP in AI* group	**P Based on the Anova
Base	9/9±2/13	3/1±2±1/22	0.06/
1min	9/13±4/12	7/13±7/13	0.03/
5 min	7/1±5/12	0/13±9/10	0.001/
10 min	9/10±7/11	9/2±3/10	0/123
15 min	2/11±4/11	0/13±2/11	1/12/
20 min	8/11±3/11	9/1±2/11	0.87/
30 min	7/11±7/11	7/10±4/11	0.30/
40 min	2/9±7/11	4/1±2/11	0.11/
50 min	0/9±1/11	0/12±1/11	0.20/
60 min	9/8±2/11	3/1±1/11	= 0.27/ P
Discharge from the Recovery	0/1±3/11	0/1±2/11	= 1.33/ P

*SA: Spinal Anesthesia

**TIVA: Intravenous Anesthesia

**P: Pvalue

#: Blood pressure

.: Systolic Blood Pressure

Discussion

Up to date there is no comprehensive study to show the benefits of SA in the process of hysteroscopy and this research is a fundamental study in this field, all results are valued and will be important. Recovery time was significantly less in our study in patients with SA vs. TIVA. This result can be considered as an important advantage for this method. In the case of ambulation time and discharge time, due to the lack of similar studies there cannot be a definite conclusion. However, compared with Majholm study and et al (2011) the results are different (9). In contrast to this study, the times were similar in both groups. In the above study in Local anesthesia patient's ambulation time and discharge time were shorter in TIVA group (10). The results indicated that absorption rate of Irrigation fluid in patients with SA group was less than TIVA group. In none of the methods, the volume of absorbed liquid was not enough that can cause significantly side effects, and there was no differences between groups in terms of acute effects such as hypernatremia exactly like other studies (7-10). Due to the process of hysteroscopy which is short, it is expected that this volume and its complications to be negligible. The prevalence of pain after prostates in patients with SA group with using of analgesics was significantly lower than TIVA group ($P < 0.005$). This result is similar to Readman (2004) and Cooper (2010) (12, 17).

The prevalence of respiratory complications during TIVA, is common and normal, but the absence of such complications in SA can be considered as an important advantage of this method (1). Among the patients who were satisfied with the type of procedure, the greatest satisfaction was related to SA method. However, it seems using the SA method for the hysterectomy procedure is not only associated with less complication, but also is better and safer.

In the study of Readman and et al (2004) mentioned that using local anesthesia was better and associated with less pain that proved our results (12). Use of nonsteroidal anti-inflammatory drugs (immediately before hysteroscopy) is more effective in controlling pain after taking a routine procedure (2). In the study of Lau and et al (2000) noted, using local anesthesia is not effective in reducing pain after hysteroscopy (7). Cooper and et al (2010) in the systematic study found that, trans-cervical anesthesia is the best way to do hysteroscopy, and mentioned this method significantly reduce the pain after the procedure (17). In this research more irrigation fluid in the method of epidural anesthesia was reported. The overall effects of TIVA is higher than side effects of irrigation fluid absorbed. Although the use of TIVA is recommended in patients with high risk of bleeding especially who take anticoagulants or have a coagulopathy disorders, in order to have more control of complications (15). On one hand, the results of the initial analysis of the data seems to be essential in future research to increase the number of samples in the groups.

Conclusion

According to the results using TIVA method for hysteroscopy process not only is better but also safer. Shorter ambulation time, discharge time, recovery time and less complication are this research advantage. On the other hand, it is recommended to reduce the possibility of bias to a minimum and eliminate confounding factors. Studies made by a single type of pathology has achieved more reliable results. Other offer in this field is that new researches are performing to compare the SA method with other methods of anesthesia except TIVA, in order to select the safest method for diagnostic and therapeutic procedures

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